173-17 ...SIBLE CHAMBER TYPE...

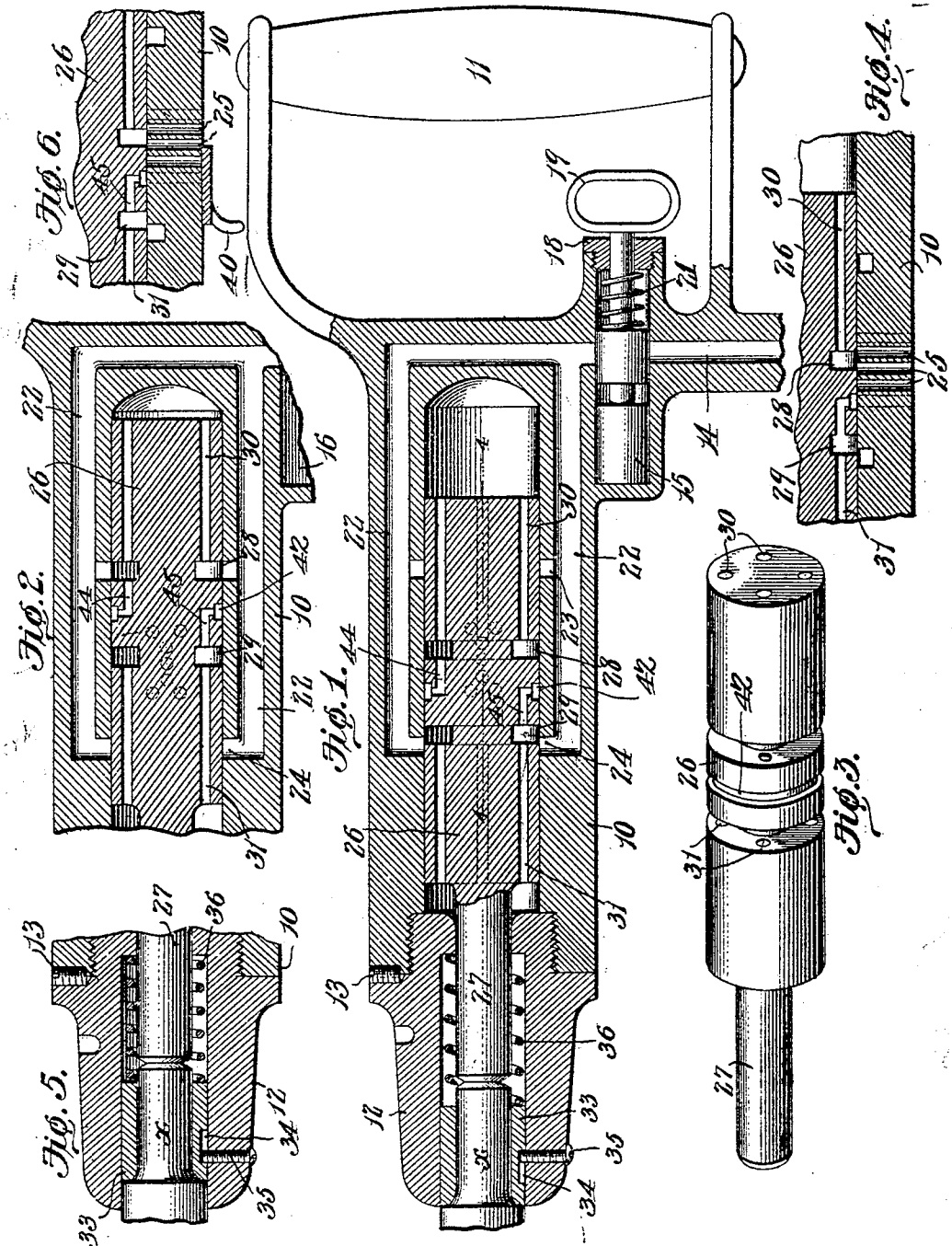
...ttsman.

No. 853,508. PATENTED MAY 14, 1907.

J. FREDERICK.

PNEUMATIC HAMMER.

APPLICATION FILED APR. 14, 1906.



WITNESSES:

E. F. Hallowell

Jno. E. Parker

Joseph Frederick, INVENTOR

By C. A. Snow & Co

ATTORNEYS

UNITED STATES PATENT OFFICE.

JOSEPH FREDERICK, OF STROUDSBURG, PENNSYLVANIA.

PNEUMATIC HAMMER.

No. 853,508. Specification of Letters Patent. Patented May 14, 1907.

Application filed April 14, 1906. Serial No. 311,752.

To all whom it may concern:

Be it known that I, JOSEPH FREDERICK, a citizen of the United States, residing at Stroudsburg, in the county of Monroe and State of Pennsylvania, have invented a new and useful Pneumatic Hammer, of which the following is a specification.

This invention relates to pneumatic hammers, drills and similar tools, wherein a reciprocatory piston is provided with ports that coact with ports in the cylinder for the purpose of admitting and exhausting air or other fluid under pressure to both ends of the cylinder.

The principal object of the invention is to provide a device of this kind which shall be of simple construction, and in which the piston or plunger may be formed of a single piece of metal provided with suitable ports and of such construction as to permit ready rotation in either direction, if necessary, thus avoiding the use of auxiliary guides and separate valve members.

A further object of the invention is to provide a tool of this character that may be taken apart by an unskilled workman, and in which it is practically impossible to replace any part in wrong position.

A still further and important object of the invention is to provide a tool in which the exhaust may be controlled by the workman, and the action of the tool regulated in accordance with the work to be performed.

A still further object of the invention is to provide a tool of this type in which the strength of the blow may be adjusted without any change in the position of the valve or increase or decrease in the pressure of the moving fluid.

With these and other objects in view, as will more fully hereinafter appear, the invention consists in certain novel features of construction and arrangement of parts, hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportions, size and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings:—Figure 1 is a sectional elevation of a pneumatic tool constructed in accordance with the invention, the piston being shown in position for admitting air for the working stroke. Fig. 2 is a similar view of a portion of the same during the position where air is admitted to the outer end of the cylinder for the return stroke. Fig. 3 is a detail perspective view of the piston, detached. Fig. 4 is a detail sectional view on the line 4—4 of Fig. 1, showing the arrangement of the exhaust ports. Fig. 5 is a detail sectional view of the forward end of the tool showing the shank of the chisel or other member pressed inward for the purpose of shortening the stroke of the piston.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

The cylinder 10 forms the body of the tool, and is provided with a suitable handle 11, which is held in one hand by the operator, while the tool is working. The outer end of the cylinder has a threaded connection with a socket member 12 in which the shank or tang of the cutting or other tool is inserted, and a locking screw 13 is used to firmly hold the parts together.

At a point adjacent to the handle is an air inlet port 14 which may be connected by a flexible tube to a source of pressure supply, such, for instance, a steam boiler or compressed air reservoir, and this port is under the control of a spring closed valve 15, working in a suitable chamber 16, the valve having a reduced stem that extends through a gland nut 18, and is provided with a finger loop 19 which is grasped and held by the workman, the valve being held out against the stress of its closing spring 21. When the loop is released, the valve instantly moves to closed position.

In order to obtain a full supply of air, the air inlet channels 22 which communicate with the valve controlled port are arranged on both sides of the cylinder, and from these channels lead ports 23 and 24 which serve, respectively, to admit air to the inner and outer ends of the cylinder. At a point between these two sets of inlet ports is arranged a series of exhaust ports 25, of which there may be any desired number, these ports being preferably in the form of small perforations anyone or more of which may be covered by the thumb or finger of the operator, so that the exhaust may be retarded, and the action of the tool correspondingly regulated, or this port may be in the form of a long narrow slit, a portion of which may be covered, and in

the larger tools a separate slidable valve may be employed for the purpose, as shown, for instance, in Fig. 6.

Arranged within the cylinder is a cylindrical piston 26, and at one end of the cylinder is a reduced stem 27 which extends into the tool socket and strikes against the shank of the tool x at each working stroke. The piston is provided with two peripheral grooves 28 and 29, extending completely around the piston, so that the latter is free to rotate, if necessary, but will always present the grooves in alinement with the inlet ports as the piston reciprocates.

Extending from the inner end of the cylinder through to the groove 28 are ports 30 of which there may be any desired number, all of the ports communicating with said groove 28, and extending from the opposite end of the cylinder to the groove 29 are similar ports 31.

The socket piece 12 is bored out to a diameter greater than that of the stem 27, and fitting within the socket is a bushing or collar 33 that is provided with an elongated slot or notch 34 into which extends one end of a screw 35 which limits the movement of the bushing. This bushing is normally held out beyond the end of the socket by a helical compression spring 36.

The shank of the chisel or other tool x is placed within the bushing, and its inner end projects somewhat beyond the inner end of said bushing in position to be struck by the stem 27.

In operation, the piston being in the position shown in Fig. 2, and the valve being opened for the purpose of allowing air to enter the channels 22, the air will pass through the ports 23 to groove 28, and thence through the ports 30 of the piston to the inner end of the cylinder, forcing the piston outward, so that the stem 27 will strike against the shank of the tool x. As the groove 28 passes the exhaust perforations 24, the air will escape from the inner end of the cylinder, and the volume and speed of such exhaust is under the control of the operator, and by covering one or more of such perforations, may retard the exhaust to any desired extent, and by covering those adjacent to the inner end of the cylinder, will prevent the passage of the air until the full stroke has been accomplished, or by covering those nearest the outer end of the cylinder, the exhaust may occur sooner in the stroke, but a greater or less volume may be obtained for cushioning purposes. When the piston reaches the position shown in Fig. 1, the groove 29 will be opened to the port 24, and air will pass from the outer end of the cylinder, thus returning the piston to the position shown in Fig. 1, and the exhaust of the return stroke may, also, be controlled by the operator. During the return movement, as the piston groove 28 passes the inlet ports 23, a quantity of air will flow into the inner end of the cylinder and act as a cushion, so that the movement will be checked and the piston will move back quickly for the second stroke. The bushing 33 permits considerable range of adjustment of the force of the blow of the piston. Should a very light blow be desired, the operator forces the chisel or other tool against the work to such an extent that the spring 36 is compressed, the bushing being forced back to the position shown in Fig. 5. This will limit the out stroke of the piston to such an extent that the lower groove 29 will not be allowed to come into alinement with the inlet port 24, the piston being in such case thrown back by the rebound. Inasmuch as the force of the blow depends to a considerable extent on the momentum of the piston, and as the momentum increases in proportion to the length of the stroke, it follows that where the stroke is short, the blow will be much lighter than where a long stroke is obtained. This adjustment, therefore, permits the operator to secure a blow of any desired force.

Fig. 6 illustrates a slight modification of the invention, wherein a valve 40 is employed to cover the exhaust ports. This is intended principally for use on large tools where the exhaust could not be readily controlled by the thumb or finger of the operator.

In order to add to the effectiveness of the tool, the piston is provided with a small annular groove 42 which connects on one side with the groove 28 through a port 44, and on the opposite side with the groove 29 through a port 45. These two ports are so comparatively small, being preferably about one-thirty-second of an inch in diameter in a tool of ordinary size, and serve to permit the passage of small quantities of air from one end of the cylinder to the other for cushioning purpose, and at the same time act in connection with the groove 42 as advance exhaust ports.

I claim:—

1. A pneumatic tool including a cylinder having a piston controlled exhaust port in its wall, said port being extended in the length of the cylinder, and a piston working within the cylinder and controlling said exhaust port, the effective area of the port being variable to control the period and volume of the exhaust from the rear of the piston to effect corresponding variation in the length and force of the working stroke.

2. In a pneumatic tool, a cylinder having in its wall an exhaust port that is extended in the direction of the length of the cylinder, a tool socket arranged at one end of the cylinder, a tool receiving bushing within a socket, a spring tending to thrust the bushing outward, and a piston arranged within the cylinder and controlling the exhaust therefrom

at the completion of the working stroke, the strength of the piston blow and the degree of exhaust being controlled by the pressure exerted in holding the tool against the work.

3. In a pneumatic tool, a cylinder having an exhaust port in its wall, said exhaust port being extended in the direction of the length of the cylinder, a tool socket arranged at one end of the cylinder, a longitudinally movable bushing disposed within the socket and adapted for the reception of a tool, a spring tending to force the bushing outward, and a piston arranged within the cylinder and controlling the exhaust port, said piston being provided with a reduced forward end for engaging the shank of the tool.

4. In a pneumatic tool, a ported cylinder, and a single piece piston provided with a pair of circumferential grooves forming ports that are movable into alinement with the cylinder ports, channels or ports leading from the ends of the piston to such grooves, and minor ports for placing the grooves in communication with each other.

5. In a pneumatic tool, a piston provided with inlet and exhaust ports, and a single piece piston having circumferential grooves forming ports that are movable into alinement with the inlet and exhaust ports, there being a plurality of ports or channels extending from each end of the piston to the nearest circumferential groove, and minor ports for placing the grooves in communication with each other.

6. In a pneumatic tool, a cylinder having inlet and exhaust ports, and a piston provided with a small port or passage placing the opposite ends of the cylinder in communication with each other.

7. In a pneumatic tool, a cylinder having inlet and exhaust ports, a piston having three annular grooves, ports leading from one of the end grooves to the adjacent end of the piston, a port leading from the opposite end groove to the opposite end of the piston, and small ports connecting the end grooves to said central groove.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

JOSEPH FREDERICK.

Witnesses:
JACOB Y. SIGAFUS,
WILLIAM A. SHAFER.